



March 26, 2009

Director
Air and Toxics Technical Enforcement Program
Office of Enforcement
Compliance and Environmental Justice
Mail Code: 8ENF-AT
U. S. EPA Region 8
1595 Wynkoop Street
Denver, CO. 80202

Re: Results of Radon Flux Testing Uranium Mill Primary Tailings Pond – Cotter Corporation
Canon City Milling Facility

Dear Director,

In accordance with the requirements of 40 CFR 61.250, Subpart W, please find enclosed the results of the radon flux measurements collected during June, 2008 in Cotter's Primary Tailings Impoundment.

These test show compliance with 40 CFR 61.252 (a) for operating uranium mill tailings piles, which limit radon emissions to 20 pCi/m²-s.

The following information is provided in accordance with 40 CFR 61.252 (a).

- 1) Name and location of mill: Cotter Corporation
Canon City Milling Facility
Canon City, Colorado 81212
- 2) Name of Mill Manager: Mr. John Hamrick
Name of Person Who Prepared Report: Mr. David L. Cooper, Tellco Environmental
- 3) Site Specific Sample Results (reference page 8 of the Tellco Environmental Report)
 - a) The mean radon flux measurements for each region within the Primary Impoundment indicated the following emanation rates:

Tailing Beaches:	38.2 pCi/m ² -s (based on 137,922 m ² area)
Dirt Cover:	14.2 pCi/m ² -s (based on 228,170 m ² area)
Standing Liquid Area:	0 pCi/m ² -s (based on 66,290 ms area)
 - b) Using the data presented above, the calculated mean radon flux for the total pile (cell), known as the Primary Impoundment is 19.7 pCi/m²-s.

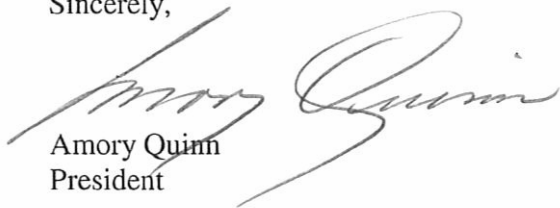
The results of individual flux measurements are presented in Appendix C of the attached Telco Environmental Report and Figure 2 shows the approximate locations of the individual flux measurements.

All tests were conducted at or above an ambient temperature of 60° F.

No condition or unusual event occurred during the measurements that could significantly affect the reported results.

4) I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment, Sec. 18, U.S.C. 1001.

Sincerely,



Amory Quinn
President

JH:kju

Attachments

cc: Steve Tarlton, CDPHE
Robert Jorgensen, CDPHE

**National Emission Standards for Hazardous Air Pollutants
2008 Radon Flux Measurement Program
Cañon City Milling Facility
0502 County Road 68
Cañon City, Colorado**

Primary Tailings Impoundment

Prepared for: Cotter Corporation
7800 E. Dorado Place, Suite 210
Englewood, Colorado 80111

Prepared by: Telco Environmental
P.O. Box 3987
Grand Junction, Colorado 81502

TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION	1
2. SITE HISTORY AND DESCRIPTION	1
3. REGULATORY REQUIREMENTS FOR THE SITE.....	1
4. SAMPLING METHODOLOGY	2
5. FIELD OPERATIONS	3
5.1 Equipment Preparation.....	3
5.2 Sample Locations, Identification, and Placement.....	3
5.3 Sample Retrieval	4
5.4 Environmental Conditions	4
6. SAMPLE ANALYSIS	4
6.1 Apparatus	4
6.2 Sample Inspection and Documentation	4
6.3 Background and Sample Counting	5
7. QUALITY CONTROL (QC) AND DATA VALIDATION	5
7.1 Sensitivity	5
7.2 Precision.....	6
7.3 Accuracy	6
7.4 Completeness	6
8. CALCULATIONS	6
9. RESULTS	7
9.1 Mean Radon Flux.....	7
9.2 Site Results	8
References.....	9
Figure 1	10

Appendix A. Charcoal Canister Analyses Support Documents

Appendix B. Recount Data Analyses

Appendix C. Radon Flux Sample Laboratory Data, Including Blanks

Appendix D. Map (Figure 2)

1. INTRODUCTION

During June 2008, Telco Environmental, LLC (Telco) of Grand Junction, Colorado, provided support to Cotter Corporation (Cotter) regarding the required National Emission Standards for Hazardous Air Pollutants (NESHAPs) Radon Flux Measurements. These measurements, collected at Cotter's primary tailings impoundment near Cañon City, Colorado, are required to show compliance with the regulations. The regulations limit the amount of radon that can be emitted per unit area (m^2) per unit of time (s). This standard is not an average per facility, but is an average per radon source.

Telco was contracted to provide radon collectors and lab analysis for calendar year 2008. Cotter personnel performed the on-site placement and retrieval of the canisters. This report addresses the procedures employed by Cotter and Telco to obtain the results presented in Section 9.0 of this report.

2. SITE DESCRIPTION

The Canon City Milling Facility is located in Fremont County in the south central part of Colorado, approximately 96 miles south of Denver and approximately 36 miles west of Pueblo. The mill site lies in a topographic bowl known as the Wolf Park Basin about 3.5 miles south of Cañon City, in a semi-rural area. The site includes approximately 1520 acres, which contains an active mill currently in stand down and an active tailings (main consisting of a primary and secondary) impoundment. Cotter's active mill began operation in 1979 and has operated periodically until 2006 when it was placed in a shutdown condition. Processing circuits were cleaned out for hazard reduction and resulting solids and liquids were sent to the active tailings impoundment.

An inactive (1956-1979) alkaline leach mill has been partially dismantled, removed to a disposal site in the primary impoundment, and partially covered with soil. Approximately 230,000 cubic yards of soil materials were moved into the southwest corner of the primary impoundment from May to September 2008. In addition, a kiln, an associated building and equipment were dismantled, sized and placed in the primary impoundment along with previously dismantled equipment.

Approximately 8,800 cubic yards of soil cover averaging four (4) feet in depth was placed on approximately one (1) acre of the northwest corner of the exposed tailings beach encompassing the locations TB69-TB72 in the latter part of 2008. Soil cover for an additional one (1) acre was placed on the exposed tailings beaches in the vicinity of locations TB37, TB39, TB76, and at dirt-covered locations DC53 and DC62, and was completed in the first part of 2009. These actions were taken to reduce areas of elevated flux as part of the As Low as Reasonably Achievable (ALARA) Program.

The active tailings impoundment (primary impoundment) is the subject of this flux monitoring report. The primary impoundment had a total area of approximately 106.84 acres according to estimates of the water solution boundary in July 2008 using the July 2006 aerial photography base map and was comprised of two source regions. The primary impoundment had a total of approximately 56.38 acres with a surface covered by various types of soils of varying thickness (Covered Region), and approximately 34.08 acres of tailings beaches (Beaches Region), with the remaining 16.38 acres covered by standing liquid in low elevation areas.

3. REGULATORY REQUIREMENTS FOR THE SITE

Radon emissions from this site are regulated under applicable standards set by the Environmental Protection Agency (EPA) for Operating Mills. Applicable regulations are specified in 40 CFR Part 61, Subpart W with technical procedures in Appendix B. These regulations are a subset of the National Emission Standards for Hazardous Air Pollutants (NESHAPs). According to subsection 61.252 Standard, (a) radon-222 emissions to ambient air from an existing uranium mill tailings pile shall not exceed an average of 20 picoCuries per square meter per second ($\text{pCi}/\text{m}^2\text{-s}$) for each pile or region.

4. SAMPLING METHODOLOGY

Radon emissions were measured using Large Area Activated Charcoal Canisters (LAACCs) in conformance with 40 CFR, Part 61, Appendix B, Method 115, Restrictions to Radon Flux Measurements, (EPA, 2008). These are passive gas adsorption sampling devices used to determine the flux rate of radon-222 gas from a surface. The LAACCs were constructed using a 10-inch diameter PVC end cap containing a bed of 180 grams of activated, granular charcoal. The prepared charcoal was placed in the LAACCs on a support grid on top of a ½ inch thick layer of foam and secured with a retaining ring under 1½ inches of foam (see Figure 1, page 10).

The sampling effort for the primary impoundment commenced on June 21, 2008 and was concluded on June 29, 2008. One hundred collectors were placed in each region. Due to worker health and safety concerns, measurement of the wet beach areas was limited to areas readily accessible by foot near the toe of the soil cover. Each charged collector was placed directly onto the surface (open face down) and exposed to the surface for 24 hours. Radon gas adsorbed onto the charcoal and the subsequent radioactive decay of the entrained radon resulted in radioactive lead-214 and bismuth-214. These radon progeny isotopes emit characteristic gamma photons that can be detected through gamma spectroscopy. The original total activity of the adsorbed radon was calculated from these gamma ray measurements using calibration factors derived from cross-calibration of standard sources containing known total activities of radium-226 with geometry identical to the counted samples and from the principles of radioactive decay.

After 24 hours, the exposed charcoal was transferred to a sealed plastic sample container (to prevent radon loss or charcoal spillage during transport), identified and labeled, and transported via common carrier to the Telco laboratory in Grand Junction, Colorado for analysis. Upon completion of on-site activities, the field equipment was alpha- and beta-gamma scanned for possible contamination resulting from fieldwork activities. All field equipment was surveyed by Cotter Radiation Safety personnel and released for unrestricted use. Telco personnel maintained custody of the samples from receipt at the analytical laboratory through analysis.

5. FIELD OPERATIONS

5.1 Equipment Preparation

All charcoal was dried at 110°C before use in the field. Unused charcoal and recycled charcoal were treated the same. 180-gram aliquots of dried charcoal were weighed and placed in sample containers.

Proper balance operation was verified daily by checking a standard weight. The balance readout agreed with the known standard weight to within ± 0.1 percent. (Appendix A).

After acceptable balance check, empty containers were individually placed on the balance and the scale was re-zeroed with the container on the balance. Unexposed and dried charcoal was carefully added to the container until the readout registered approximately 180 grams. The lid was immediately placed on the container and sealed with plastic tape. The balance was checked for readout drift between readings.

Sealed containers with unexposed charcoal were placed individually in the shielded counting well, with the bottom of the container centered over the detector and the background count rate was documented. Three five-minute background counts were conducted on ten percent of the containers, selected at random to represent the "batch". If the background counts were too high to achieve an acceptable lower limit of detection (LLD), the entire charcoal batch was labeled non-conforming and recycled through the heating/drying process.

5.2 Sample Locations, Identification, and Placement

Designated sample point locations were established within the region and marked with pin flags. A sample identification number (ID) was assigned to every sample point, using a sequential alpha-numeric system indicating the charcoal batch and physical location within the region (e.g., A01...A110). This ID was written on an adhesive label and affixed to the top of the collector. The sample ID, date, and time of placement were recorded on the radon flux measurements data sheets for the set of one hundred five measurements.

The sampling locations were spread out as evenly as feasible throughout each region. Prior to placing a collector at each sample location, the retaining ring, screen, and foam pad of each collector were removed to expose the charcoal support grid. A pre-measured charcoal charge was selected from a batch, opened and distributed evenly across the support grid. The collector was then reassembled and placed face down on the surface at each pin flagged sampling location. Care was exercised not to push the device into the soil surface. The collector rim was "sealed" to the surface using a berm of local borrow material.

Five blank collectors for each region were also collected during this sampling effort. The charcoal blanks remained inside an airtight plastic bag in the collector during the 24-hour testing period.

5.3 Sample Retrieval

At the end of the 24-hour testing period, all collectors were disassembled and each sample was individually poured through a funnel into a container. Identification numbers were transferred to the appropriate container, which was sealed and placed in a box for transport. Retrieval date and time were recorded on the same data sheet as the sample placement information. The blank samples were similarly processed.

5.4 Environmental Conditions

A rain gauge and a minimum/maximum thermometer at Cotter's on-site meteorological station were used to monitor rainfall and air temperatures during sampling in order to ensure compliance with the regulatory measurement criteria.

In accordance with 40 CFR, Part 61, Appendix B, Method 115:

- Measurements were not initiated within 24 hours of a rainfall.
- Approximately 0.02 inches of rainfall occurred after the completion of placement of canisters on the Beach Region on June 28, 2008. None of the earthen seals around any canister were compromised and none of the canisters were surrounded by water.
- The measurements presented in this report were not performed during temperatures below 35°F or on frozen ground (the minimum air temperature recorded at the site during the primary impoundment measurement periods was 58°F).

6. SAMPLE ANALYSIS

6.1 Apparatus

Apparatus used for the analysis:

- Single- or multi-channel pulse height analysis system, Ludlum Model 2200 with a Teledyne 3" x 3" sodium iodide, thallium-activated (NaI(Tl)) detector.
- Lead shielded counting well approximately 40 cm deep with 5-cm thick lead walls and a 7-cm thick base and 5 cm thick top.
- National Institute of Standards and Technology (NIST) traceable aqueous solution radium-226 absorbed onto 180 grams of activated charcoal.
- Ohaus Model C501 balance with 0.1-gram sensitivity.

6.2 Sample Inspection and Documentation

Once in the laboratory, the integrity of each charcoal container was verified by visual inspection of the plastic container. Laboratory staff documented damaged or unsealed containers and verified that the data sheet was complete.

All of the sample containers received from the primary impoundment were found to be properly sealed and in good condition upon inspection at the Telco analytical laboratory.

The sample IDs, regions, and sampling times were complete on the radon flux measurements data sheets.

6.3 Background and Sample Counting

The gamma ray counting system was checked daily, including background and radium-226 source measurements prior to and after each counting session. Based on calibration statistics, using sources with known radium-226 content, background and source control limits were established for each Ludlum/Teledyne counting system with shielded well (Appendix A).

Gamma ray counting of exposed charcoal samples included the following steps:

- The length of count time was determined by the activity of the sample being analyzed, according to a data quality objective of a minimum of 1,000 accrued counts for any given sample.
- The sample container was centered on the NaI detector and the shielded well door was closed.
- The sample was counted over the determined period and then the mid-sample count time, date, and counts were documented on the radon flux measurements data sheet(s) and used in the calculations.
- The above steps were repeated for each exposed charcoal sample.
- Approximately 10 percent of the containers counted were selected for recounting. These containers were recounted the next day following the original count.

7. QUALITY CONTROL (QC) AND DATA VALIDATION

Charcoal flux measurement QC samples included the following intra-laboratory analytical frequency objectives:

- Recounts, 10 percent, and
- Blanks, 5 percent

All sample data were subjected to validation protocols that included assessments of sensitivity, precision, accuracy, and completeness. All method-required data quality objectives (EPA, 2008) were attained.

7.1 Sensitivity

A total of ten blanks were analyzed by measuring the radon progeny activity in samples subjected to all aspects of the measurement process, excepting exposure to the source region (see Appendix C). These blank sample measurements comprised approximately 5 percent of the field measurements. The results of the blank sample analyses measured radon flux rates that ranged from

0.01 to 0.09 pCi/m²-s, with an average of approximately 0.05 pCi/m²-s.

7.2 Precision

Twenty recount measurements, distributed throughout the sample sets, were performed by replicating analyses of individual field samples (see Appendix B). These recount measurements comprised approximately 10 percent of the total number of samples analyzed. The precision of these recount measurements, expressed as relative percent difference (RPD), ranged from less than 0.1 percent to 13.6 percent, with an overall average precision of approximately 2.6 percent.

7.3 Accuracy

Accuracy of field measurements was assessed daily by counting two laboratory control samples with known Ra-226 content. Accuracy of these lab control sample measurements, expressed as percent bias, ranged from -1.1 percent to +1.4 percent. The arithmetic average bias of the lab control sample measurements was approximately -0.3 percent (see Appendix A).

7.4 Completeness

Ninety-nine samples from the Beaches Region were verified during this sampling program, representing 99 percent completeness for that region.

All one hundred samples from the Covered Region were ultimately verified, representing 100 percent completeness for that region.

8. CALCULATIONS

Radon flux rates were calculated for charcoal collection samples using calibration factors derived from cross-calibration to sources with known total activity with identical geometry as the charcoal containers. A yield efficiency factor was used to calculate the total activity of the sample charcoal containers. Individual field sample result values presented were not reduced by the results of the field blank analyses.

In practice, radon flux rates were calculated by a database computer program. The algorithms utilized by the data base program were as follows:

Equation 8.1:

$$\text{pCi Rn-222/m}^2\text{sec} = \frac{N}{[T_s * A * b * 0.5^{(d/91.75)}]}$$

where: N = net sample count rate, cpm under 220-662 keV peak
Ts = sample duration, seconds
b = instrument calibration factor, cpm per pCi; values used:
0.1714, for M-01/D-21 and
0.1720, for M-02/D-20
d = decay time, elapsed hours between sample mid-time and count mid-time
A = area of the collector, m²

Equation 8.2:

$$\text{Error, } 2\sigma = 2 \times \frac{\sqrt{\frac{\text{Gross Sample, cpm}}{\text{Sample Count, t, min}} + \frac{\text{Background Sample, cpm}}{\text{Background Count, t, min}}}}{\text{Net, cpm}} \times \text{Sample Concentration}$$

Equation 8.3:

$$\text{LLD} = \frac{2.71 + (4.65)(S_b)}{[T_s * A * b * 0.5^{(d/91.75)}]}$$

where: 2.71 = constant

4.65 = confidence interval factor

S_b = standard deviation of the background count rate

T_s = sample duration, seconds

b = instrument calibration factor, cpm per pCi; values used:

0.1714, for M-01/D-21 and

0.1720, for M-02/D-20

d = decay time, elapsed hours between sample mid-time and count mid-time

A = area of the collector, m^2

9. RESULTS

9.1 Mean Radon Flux

Referencing 40 CFR, Part 61, Subpart W, Appendix B, Method 115 - Monitoring for Radon-222 Emissions, Subsection 2.1.7 - Calculations, "the mean radon flux for each region of the pile and for the total pile shall be calculated and reported as follows:

- (a) The individual radon flux calculations shall be made as provided in Appendix A EPA 86(1). The mean radon flux for each region of the pile shall be calculated by summing all individual flux measurements for the region and dividing by the total number of flux measurements for the region.
- (b) The mean radon flux for the total uranium mill tailings pile shall be calculated as follows:

$$J_s = \frac{J_1 A_1 + \dots J_2 A_2 [+ \dots J_i A_i]}{A_t}$$

Where: J_s = Mean flux for the total pile ($pCi/m^2 \cdot s$)

J_i = Mean flux measured in region i ($pCi/m^2 \cdot s$)

A_i = Area of region i (m^2)

A_t = Total area of the pile (m^2)

2.1.8 Reporting. The results of individual flux measurements, the approximate locations on the pile, and the mean radon flux for each region and the mean radon flux for the total stack [pile] shall be included in the emission test report. Any condition or unusual event that occurred during the measurements that could significantly affect the results should be reported."

9.2 Site Results

Site Specific Sample Results (reference Figure 2 and Appendix C)

(a) The mean radon flux rate for each region within the Primary Impoundment is as follows:

Tailings Beaches	= 38.2 pCi/m ² -s (based on 137,922 m ² area)
Dirt Cover	= 14.2 pCi/m ² -s (based on 228,170 m ² area)
Standing Liquid Areas	= 0 pCi/m ² -s (based on 66,290 m ² area)

(b) Using the data presented above, the calculated mean radon flux rate for the total pile (cell), known as the Primary Impoundment, is 19.7 pCi/m²-s, is as follows:

$$\frac{(38.2)(137,922) + (14.2)(228,170) + (0)(66,290)}{432,382} = 19.7$$

As shown above, the arithmetic mean radon flux for the Primary Impoundment at Cotter Corporation's Cañon City Milling facility is below the NRC and EPA standard of 20 pCi/m²-s. No condition or unusual event occurred during the measurements that could significantly affect the reported results. Appendix C is a summary of individual measurement results, including blank sample analysis. Sample locations are depicted on Figure 2, which is included in Appendix D. The map was produced by Cotter.

References

- U. S. Environmental Protection Agency, *Radon Flux Measurements on Gardinier and Royster Phosphogypsum Piles Near Tampa and Mulberry, Florida*, EPA 520/5-85-029, NTIS #PB86-161874, January 1986.
- U. S. Environmental Protection Agency, *Title 40, Code of Federal Regulations*, February 2008.
- U. S. Nuclear Regulatory Commission, *Radiological Effluent and Environmental Monitoring at Uranium Mills*, Regulatory Guide 4.14, April 1980.
- U. S. Nuclear Regulatory Commission, *Title 10, Code of Federal Regulations*, Part 40, Appendix A, January 2008.

Appendix A

Charcoal Canister Analyses Support Documents

BALANCE OPERATION DAILY CHECK

Balance Model: Ohaus Port-o-gram

Standard Weight (g): 200.0

[illegible]

COTTER CORPORATION
CANON CITY, COLORADO
2008 NESHAPs RADON FLUX MEASUREMENTS
PRIMARY AND SECONDARY IMPOUNDMENTS

SYSTEM I.D.	DATE	Bkg Counts (1 min. each)			Source Counts (1 min. each)			AVG NET cpm	YIELD cpm/pCi	FOUND pCi	SOURCE ID	KNOWN pCi	% BIAS
		#1	#2	#3	#1	#2	#3						
M-01/D-21	6/24/2008	128	146	152	10433	10293	10380	10227	0.1714	59665	GS-04	59300	0.6%
M-01/D-21	6/24/2008	144	139	145	10326	10376	10246	10173	0.1714	59354	GS-04	59300	0.1%
M-01/D-21	6/25/2008	136	126	122	10388	10486	10417	10302	0.1714	60107	GS-04	59300	1.4%
M-01/D-21	6/25/2008	146	132	136	10385	10373	10273	10206	0.1714	59543	GS-04	59300	0.4%
M-01/D-21	7/2/2008	141	133	147	10396	10405	10527	10302	0.1714	60107	GS-04	59300	1.4%
M-01/D-21	7/2/2008	150	138	136	10246	10133	10201	10052	0.1714	58646	GS-04	59300	-1.1%
M-01/D-21	7/3/2008	146	134	134	10184	10353	10196	10106	0.1714	58963	GS-04	59300	-0.6%
M-01/D-21	7/3/2008	147	142	130	10261	10211	10417	10157	0.1714	59257	GS-04	59300	-0.1%
M-01/D-21	6/24/2008	128	146	152	10402	10351	10433	10253	0.1714	59821	GS-05	59300	0.9%
M-01/D-21	6/24/2008	144	139	145	10145	10309	10384	10137	0.1714	59140	GS-05	59300	-0.3%
M-01/D-21	6/25/2008	136	126	122	10415	10337	10172	10180	0.1714	59393	GS-05	59300	0.2%
M-01/D-21	6/25/2008	146	132	136	10203	10275	10397	10154	0.1714	59240	GS-05	59300	-0.1%
M-01/D-21	7/2/2008	141	133	147	10371	10440	10470	10287	0.1714	60016	GS-05	59300	1.2%
M-01/D-21	7/2/2008	150	138	136	10260	10217	10302	10118	0.1714	59033	GS-05	59300	-0.4%
M-01/D-21	7/3/2008	146	134	134	10279	10257	10437	10186	0.1714	59430	GS-05	59300	0.2%
M-01/D-21	7/3/2008	147	142	130	10230	10337	10234	10127	0.1714	59086	GS-05	59300	-0.4%
M-02/D-20	6/24/2008	112	130	144	10282	10398	10273	10189	0.1720	59238	GS-04	59300	-0.1%
M-02/D-20	6/24/2008	130	130	135	10370	10227	10233	10145	0.1720	58983	GS-04	59300	-0.5%
M-02/D-20	6/25/2008	122	133	132	10480	10278	10174	10182	0.1720	59196	GS-04	59300	-0.2%
M-02/D-20	6/25/2008	115	127	113	10433	10481	10382	10314	0.1720	59963	GS-04	59300	1.1%
M-02/D-20	7/2/2008	133	145	134	10478	10388	10588	10347	0.1720	60159	GS-04	59300	1.4%
M-02/D-20	7/2/2008	118	127	132	10462	10461	10266	10271	0.1720	59713	GS-04	59300	0.7%
M-02/D-20	7/3/2008	124	140	113	10455	10231	10216	10175	0.1720	59157	GS-04	59300	-0.2%
M-02/D-20	7/3/2008	118	126	138	10173	10210	10356	10119	0.1720	58831	GS-04	59300	-0.8%
M-02/D-20	6/24/2008	112	130	144	10529	10351	10506	10333	0.1720	60078	GS-05	59300	1.3%
M-02/D-20	6/24/2008	130	130	135	10384	10507	10341	10279	0.1720	59762	GS-05	59300	0.8%
M-02/D-20	6/25/2008	122	133	132	10460	10586	10244	10301	0.1720	59890	GS-05	59300	1.0%
M-02/D-20	6/25/2008	115	127	113	10421	10499	10316	10294	0.1720	59847	GS-05	59300	0.9%
M-02/D-20	7/2/2008	133	145	134	10610	10432	10582	10404	0.1720	60488	GS-05	59300	2.0%
M-02/D-20	7/2/2008	118	127	132	10229	10177	10471	10167	0.1720	59109	GS-05	59300	-0.3%
M-02/D-20	7/3/2008	124	140	113	10179	10435	10408	10215	0.1720	59390	GS-05	59300	0.2%
M-02/D-20	7/3/2008	118	126	138	10433	10178	10466	10232	0.1720	59486	GS-05	59300	0.3%
AVERAGE PERCENT BIAS FOR ALL ANALYTICAL SESSIONS: 0.3%													

SITE LOCATION: Cañon City, CO

CLIENT: Cotter Corporation

System ID: M-01/D-21 Calibration Date: 4/05/08 Due Date: 6/05/09

Scaler S/N: 51572 High Voltage: Window: 4.42 Thrshld: 2.20

Detector S/N: 041533 Source ID/SN: Ra 226
GS-04 Source Activity: 59.3 Kpc

Blank Canister Bkgd. Range, cpm: $2\sigma =$ 110 to 160 $3\sigma =$ 97 to 172

Gross Source Range, cpm: $2\sigma = 9882$ to 10642 $3\sigma = 9692$ to 10832

Technician: DL Coen

[illegible]

N = average background and source cpm does not fall within the control limits.

The acceptable ranges were determined from prior background and source check data.

SITE LOCATION: Cañon City, CO

CLIENT: Cotter Corporation

Calibration Check Log

System ID: M-01 / D-21 Calibration Date: 6/05/08 Due Date: 6/05/09

Scaler S/N: 51572 High Voltage: Window: 4.42 Thrshld: 2.20

Detector S/N: 041533 Source ID/SN: GS-05 Source Activity: 59.3 KpCi

Blank Canister Bkgd. Range, cpm: $2\sigma =$ 110 to 160 $3\sigma =$ 97 to 172

Gross Source Range, cpm: $2\sigma = 10080$ to 10599 $3\sigma = 9950$ to 10729

Technician: DL Coor

All counts times are one minute.

[illegible]

Y/N: Y = average background and source cpm falls within the control limits.

N = average background and source cpm does not fall within the control limits.

The acceptable ranges were determined from prior background and source check data.

SITE LOCATION: Cañon City, CO

Calibration Check Log

Technician: DL Coq

The acceptable ranges were determined from prior background and source check data.

SITE LOCATION: Cañon City, CO

System ID: M-02/D-20 Calibration Date: 6/05/08 Due Date: 6/05/09

Scaler S/N: 51563 High Voltage: Window: 4.42 Thrshld: 2.20

Detector S/N: 041532 Source ID/SN: Ra-226
GS-05 Source Activity: 59.3 KpCi

Blank Canister Bkgd. Range, cpm: $2\sigma =$ 91 to 171 $3\sigma =$ 71 to 191

Gross Source Range, cpm: $2\sigma = \underline{10154}$ to $\underline{10618}$ $3\sigma = \underline{10038}$ to $\underline{10734}$

[illegible]

The acceptable ranges were determined from prior background and source check data.

Appendix B

Recount Data Analyses

CLIENT: COTTER CORP. PROJECT: RADON FLUX MEASUREMENTS, CANON CITY, CO PROJECT NO.: 080005.00

PILE: PRIMARY BATCH: F SURFACE: TAILINGS AIR TEMP MIN: 58°F WEATHER: 0.02 INCHES AFTER PLACEMENT
AREA: BEACH DEPLOYED: 6 28 8 RETRIEVED: 6 29 8 CHARCOAL BKG: 145 cpm Wt. Out: 180.0 g.
FIELD TECHNICIANS: P. Usnick, M. Villagrana COUNTED BY: DLC DATA ENTRY BY: DLC TARE WEIGHT: 29.2 g.
COUNTING SYSTEM I.D.: M01/D21, M02/D20 CAL. DUE: 6/05/09

RECOUNT CANISTER ANALYSIS:

RECOUNT OF THE MONITORING REGION:																		
GRID LOCATION	SAMPLE I. D.	DEPLOY HR	RETRIV MIN	ANALYSIS MO	MID-TIME DA	YR	HR	MIN	CNT (MIN)	GROSS COUNTS	GROSS WT IN	RADON pCi/m ² s	± pCi/m ² s	LLD pCi/m ² s	PRECISION % RPD			
TB10 RECOUNT	F10	7	2	7	58	7	2	8	21	1	4	1001	225.5	0.27	0.0	0.05		
	F10	7	2	7	58	7	3	8	6	24	4	1020	225.5	0.30	0.1	0.05	10.5%	
TB20 RECOUNT	F20	7	17	8	4	7	2	8	21	13	1	4973	224.8	12.5	1.3	0.05		
	F20	7	17	8	4	7	3	8	6	23	1	4770	224.8	12.8	1.3	0.05	2.4%	
TB30 RECOUNT	F30	7	34	8	9	7	2	8	21	27	4	1015	227.4	0.28	0.0	0.05		
	F30	7	34	8	9	7	3	8	6	29	5	1240	227.4	0.29	0.0	0.05	3.5%	
TB40 RECOUNT	F40	8	10	8	12	7	2	8	21	36	1	14980	219.6	39.6	4.0	0.05		
	F40	8	10	8	12	7	3	8	6	27	1	13955	219.6	39.4	3.9	0.05	0.5%	
TB50 RECOUNT	F50	8	21	8	53	7	2	8	21	42	1	11265	223.2	29.0	2.9	0.05		
	F50	8	21	8	53	7	3	8	6	32	1	10530	223.2	28.9	2.9	0.05	0.3%	
TB60 RECOUNT	F60	8	37	8	57	7	2	8	21	52	1	9082	226.5	23.5	2.4	0.05		
	F60	8	37	8	57	7	3	8	6	32	1	8467	226.5	23.3	2.3	0.05	0.9%	
TB70 RECOUNT	F70	8	51	9	25	7	2	8	21	58	1	350329	233.1	909.6	91.0	0.05		
	F70	8	51	9	25	7	3	8	6	33	1	328473	233.1	909.9	91.0	0.05	0.0%	
TB80 RECOUNT	F80	9	15	9	35	7	2	8	22	4	1	30868	228.7	80.5	8.1	0.05		
	F80	9	15	9	35	7	3	8	6	33	1	28772	228.7	79.9	8.0	0.05	0.7%	
TB90 RECOUNT	F90	9	35	9	59	7	2	8	22	13	1	4942	223.3	12.5	1.3	0.05		
	F90	9	35	9	59	7	3	8	6	35	1	4558	223.3	12.3	1.2	0.05	1.6%	
TB99 RECOUNT	F99	9	49	9	56	7	2	8	22	34	1	2416	228.4	6.0	0.6	0.05		
	F99	9	49	9	56	7	3	8	6	35	1	2285	228.4	6.0	0.6	0.05	0.0%	
												AVERAGE PERCENT PRECISION FOR THE PRIMARY BEACHES REGION:						2.1%

CLIENT: COTTER CORP. PROJECT: RADON FLUX MEASUREMENTS, CANON CITY, CO PROJECT NO.: 08005.00

PILE: PRIMARY BATCH: D SURFACE: SOIL AIR TEMP MIN: 59°F WEATHER: NO RAIN

AREA: COVER DEPLOYED: 6 21 8 RETRIEVED: 6 22 8 CHARCOAL BKG: 147 cpm Wt. Out: 180.0 g.

FIELD TECHNICIANS: P. Usnick, M. Villagrana COUNTED BY: DLC DATA ENTRY BY: DLC TARE WEIGHT: 29.2 g.

COUNTING SYSTEM I.D.: M01/D21, M02/D20 CAL. DUE: 6/05/09

RECOUNT CANISTER ANALYSIS:

ACCOUNT OF MONITORING LOG:																
GRID LOCATION	SAMPLE I. D.	DEPLOY HR	RETRIV HR	ANALYSIS MIN	MO	DA	YR	MID-TIME HR	CNT (MIN)	GROSS COUNTS	GROSS WT IN	RADON pCi/m ² s	± pCi/m ² s	LLD pCi/m ² s	PRECISION % RPD	
DC10 RECOUNT	D10	6	36	7	33	6	24	8	14	36	1	3840	217.2	7.6	0.8	0.04
	D10	6	36	7	33	6	25	8	8	41	1	3435	217.2	7.8	0.8	0.04
DC20 RECOUNT	D20	6	55	7	39	6	24	8	14	46	2	1285	222.3	1.0	0.1	0.04
	D20	6	55	7	39	6	25	8	8	41	2	1099	222.3	1.0	0.1	0.04
DC30 RECOUNT	D30	7	15	7	52	6	24	8	14	59	3	1033	220.5	0.41	0.0	0.04
	D30	7	15	7	52	6	25	8	8	44	3	1038	220.5	0.47	0.1	0.04
DC40 RECOUNT	D40	7	33	8	24	6	24	8	15	13	1	1863	217.9	3.5	0.4	0.04
	D40	7	33	8	24	6	25	8	8	44	1	1623	217.9	3.5	0.4	0.04
DC50 RECOUNT	D50	7	47	8	30	6	24	8	15	26	3	1118	220.7	0.47	0.1	0.04
	D50	7	47	8	30	6	25	8	8	47	3	1008	220.7	0.45	0.1	0.04
DC60 RECOUNT	D60	8	1	8	38	6	24	8	15	37	1	11450	220.8	23.4	2.3	0.04
	D60	8	1	8	38	6	25	8	8	46	1	10015	220.8	23.3	2.3	0.04
DC70 RECOUNT	D70	8	32	9	5	6	24	8	15	42	1	32923	216.3	67.9	6.8	0.04
	D70	8	32	9	5	6	25	8	8	50	1	29090	216.3	68.5	6.9	0.04
DC80 RECOUNT	D80	8	49	9	13	6	24	8	15	51	1	3079	220.7	6.1	0.6	0.04
	D80	8	49	9	13	6	25	8	8	49	1	2653	220.7	5.9	0.6	0.04
DC90 RECOUNT	D90	9	0	9	18	6	24	8	15	58	1	9804	219.6	20.2	2.0	0.04
	D90	9	0	9	18	6	25	8	8	51	1	8587	219.6	20.1	2.0	0.04
DC100 RECOUNT	D100	9	10	9	25	6	24	8	16	12	1	1260	213.8	2.3	0.2	0.04
	D100	9	10	9	25	6	25	8	8	51	1	1088	213.8	2.2	0.2	0.04
AVERAGE PERCENT PRECISION FOR THE PRIMARY COVERED REGION: 3.0%																

Appendix C

Radon Flux Sample Laboratory Data (including Blanks)

CLIENT: COTTER CORP. PROJECT: RADON FLUX MEASUREMENTS, CANON CITY, CO PROJECT NO.: 08005.00

PILE: PRIMARY BATCH: D SURFACE: SOIL AIR TEMP MIN: 59°F
AREA: COVER DEPLOYED: 6 21 8 RETRIEVED: 6 22 8 CHARCOAL BKG:
FIELD TECHNICIANS: P. Usnick, M. Currey, M. Villagrana COUNTED BY: DLC DATA ENTRY BY: DLC
COUNTING SYSTEM I.D.: M01/D21, M02/D20 CAL. DUE: 6/05/09

WEATHER: NO RAIN
147 cpm
Wt. Out: 180.0 g.
TARE WEIGHT: 29.2 g.

GRID LOCATION	SAMPLE I. D.	DEPLOY		RETRIV		ANALYSIS			MID-TIME		CNT (MIN)	GROSS COUNTS	GROSS WT IN	RADON		LLD
		HR	MIN	HR	MIN	MO	DA	YR	HR	MIN				pCi/m ² s	± pCi/m ² s	
DC01	D01	6	22	7	26	6	24	8	14	30	1	4030	216.6	8.0	0.80	0.04
DC02	D02	6	24	7	26	6	24	8	14	30	1	29039	220.8	59.0	5.90	0.04
DC03	D03	6	26	7	27	6	24	8	14	31	1	3766	213.5	7.4	0.74	0.04
DC04	D04	6	27	7	27	6	24	8	14	31	1	3030	216.2	5.9	0.59	0.04
DC05	D05	6	28	7	28	6	24	8	14	33	2	1166	216.3	0.9	0.09	0.04
DC06	D06	6	29	7	29	6	24	8	14	33	2	1002	217.5	0.7	0.07	0.04
DC07	D07	6	31	7	30	6	24	8	14	35	1	1577	222.7	2.9	0.29	0.04
DC08	D08	6	33	7	31	6	24	8	14	35	1	4043	217.2	8.0	0.80	0.04
DC09	D09	6	34	7	31	6	24	8	14	36	1	2196	220.5	4.2	0.42	0.04
DC10	D10	6	36	7	33	6	24	8	14	36	1	3840	217.2	7.6	0.76	0.04
DC11	D11	6	38	7	30	6	24	8	14	37	1	2631	216.2	5.1	0.51	0.04
DC12	D12	6	39	7	32	6	24	8	14	37	1	15076	218.5	30.7	3.07	0.04
DC13	D13	6	41	7	34	6	24	8	14	38	1	2208	229.5	4.2	0.42	0.04
DC14	D14	6	42	7	36	6	24	8	14	38	1	2398	232.9	4.6	0.46	0.04
DC15	D15	6	44	7	35	6	24	8	14	40	1	34017	220.3	69.9	6.99	0.04
DC16	D16	6	47	7	34	6	24	8	14	41	4	1088	216.3	0.3	0.04	0.04
DC17	D17	6	48	7	34	6	24	8	14	44	1	11898	216.4	24.4	2.44	0.04
DC18	D18	6	51	7	37	6	24	8	14	44	1	1805	214.0	3.4	0.34	0.04
DC19	D19	6	53	7	38	6	24	8	14	47	3	1198	221.4	0.5	0.05	0.04
DC20	D20	6	55	7	39	6	24	8	14	46	2	1285	222.3	1.0	0.10	0.04
DC21	D21	6	57	7	41	6	24	8	14	50	3	1452	225.4	0.7	0.07	0.04
DC22	D22	6	59	7	42	6	24	8	14	50	3	1461	217.3	0.7	0.07	0.04
DC23	D23	7	1	7	43	6	24	8	14	52	1	1315	219.8	2.4	0.24	0.04
DC24	D24	7	3	7	44	6	24	8	14	52	1	3744	219.4	7.4	0.74	0.04
DC25	D25	7	4	7	45	6	24	8	14	54	2	1837	218.4	1.6	0.16	0.04
DC26	D26	7	6	7	46	6	24	8	14	54	2	1134	219.1	0.9	0.09	0.04
DC27	D27	7	9	7	48	6	24	8	14	56	1	2093	219.2	4.0	0.40	0.04
DC28	D28	7	11	7	49	6	24	8	14	56	2	1103	215.1	0.8	0.08	0.04
DC29	D29	7	13	7	51	6	24	8	14	58	1	1166	224.1	2.1	0.21	0.04
DC30	D30	7	15	7	52	6	24	8	14	59	3	1033	220.5	0.4	0.05	0.04
DC31	D31	7	18	7	53	6	24	8	15	0	1	1464	219.4	2.7	0.27	0.04
DC32	D32	7	20	7	54	6	24	8	15	3	4	1040	219.0	0.2	0.04	0.04
DC33	D33	7	23	7	56	6	24	8	15	6	2	1097	215.8	0.8	0.08	0.04
DC34	D34	7	25	8	20	6	24	8	15	6	1	2216	218.3	4.2	0.42	0.04
DC35	D35	7	26	8	21	6	24	8	15	9	4	1029	218.8	0.2	0.04	0.04
DC36	D36	7	28	8	22	6	24	8	15	8	2	1867	220.7	1.6	0.16	0.04
DC37	D37	7	29	8	22	6	24	8	15	12	1	2946	214.7	5.8	0.58	0.04
DC38	D38	7	31	8	23	6	24	8	15	12	1	1234	217.4	2.2	0.22	0.04

CLIENT: COTTER CORP. PROJECT: RADON FLUX MEASUREMENTS, CANON CITY, CO PROJECT NO.: 08005.00

PILE: PRIMARY BATCH: D SURFACE: SOIL AIR TEMP MIN: 59°F WEATHER: NO RAIN
AREA: COVER DEPLOYED: 6 21 8 RETRIEVED: 6 22 8 CHARCOAL BKG: 147 cpm Wt. Out: 180.0 g.
FIELD TECHNICIANS: P. Usnick, M. Currey, M. Villagrana COUNTED BY: DLC DATA ENTRY BY: DLC TARE WEIGHT: 29.2 g.
COUNTING SYSTEM I.D.: M01/D21, M02/D20 CAL. DUE: 6/05/09

GRID LOCATION	SAMPLE I. D.	DEPLOY		RETRIV		ANALYSIS		MID-TIME		CNT (MIN)	GROSS COUNTS	GROSS WT IN	RADON pCi/m² s	± pCi/m² s	LLD pCi/m² s	COMMENTS:
		HR	MIN	HR	MIN	MO	DA	YR	HR							
DC39	D39	7	32	8	24	6	24	8	15	14	2	1777	217.0	1.5	0.15	0.04
DC40	D40	7	33	8	24	6	24	8	15	13	1	1863	217.9	3.5	0.35	0.04
DC41	D41	7	34	8	25	6	24	8	15	16	1	11715	216.0	23.8	2.38	0.04
DC42	D42	7	35	8	25	6	24	8	15	16	1	1001	214.7	1.8	0.18	0.04
DC43	D43	7	37	8	26	6	24	8	15	17	1	2970	216.8	5.8	0.58	0.04
DC44	D44	7	38	8	26	6	24	8	15	18	2	1239	218.7	1.0	0.10	0.04
DC45	D45	7	40	8	27	6	24	8	15	20	2	1097	218.2	0.8	0.08	0.04
DC46	D46	7	41	8	27	6	24	8	15	20	1	1719	220.8	3.2	0.32	0.04
DC47	D47	7	43	8	28	6	24	8	15	23	2	1456	218.4	1.2	0.12	0.04
DC48	D48	7	44	8	29	6	24	8	15	22	1	6118	217.9	12.3	1.23	0.04
DC49	D49	7	45	8	29	6	24	8	15	25	1	6657	221.6	13.5	1.35	0.04
DC50	D50	7	47	8	30	6	24	8	15	26	3	1118	220.7	0.5	0.05	0.04
DC51	D51	7	48	8	31	6	24	8	15	28	1	6657	218.6	13.5	1.35	0.04
DC52	D52	7	50	8	32	6	24	8	15	29	2	1555	222.6	1.3	0.13	0.04
DC53	D53	7	51	8	33	6	24	8	15	31	1	49370	219.7	102.1	10.21	0.04
DC54	D54	7	53	8	33	6	24	8	15	31	1	37074	219.2	76.4	7.64	0.04
DC55	D55	7	54	8	34	6	24	8	15	32	1	3989	221.1	8.0	0.80	0.04
DC56	D56	7	55	8	34	6	24	8	15	33	3	1442	216.5	0.7	0.07	0.04
DC57	D57	7	57	8	36	6	24	8	15	35	1	1133	217.1	2.0	0.20	0.04
DC58	D58	7	58	8	37	6	24	8	15	35	1	5068	216.5	10.2	1.02	0.04
DC59	D59	7	59	8	37	6	24	8	15	37	1	17542	218.2	36.2	3.62	0.04
DC60	D60	8	1	8	38	6	24	8	15	37	1	11450	220.8	23.4	2.34	0.04
DC61	D61	8	2	8	39	6	24	8	15	38	1	15521	217.7	32.0	3.20	0.04
DC62	D62	8	4	8	59	6	24	8	15	38	1	54206	214.4	110.6	11.06	0.04
DC63	D63	8	5	8	40	6	24	8	15	39	1	26107	216.9	54.1	5.41	0.04
DC64	D64	8	6	8	42	6	24	8	15	39	1	4593	217.5	9.2	0.92	0.04
DC65	D65	8	8	8	44	6	24	8	15	40	1	12222	216.6	25.1	2.51	0.04
DC66	D66	8	9	8	45	6	24	8	15	40	1	3951	219.6	7.9	0.79	0.04
DC67	D67	8	27	8	43	6	24	8	15	41	1	1944	218.7	3.8	0.38	0.04
DC68	D68	8	30	8	41	6	24	8	15	41	1	15086	215.5	31.5	3.15	0.04
DC69	D69	8	31	9	4	6	24	8	15	42	1	3449	216.8	6.9	0.69	0.04
DC70	D70	8	32	9	5	6	24	8	15	42	1	32923	216.3	67.9	6.79	0.04
DC71	D71	8	34	9	6	6	24	8	15	44	1	9720	220.9	19.9	1.99	0.04
DC72	D72	8	35	9	7	6	24	8	15	44	1	8827	221.6	18.0	1.80	0.04
DC73	D73	8	37	9	7	6	24	8	15	45	1	17903	218.8	37.0	3.70	0.04
DC74	D74	8	39	9	8	6	24	8	15	45	1	20555	215.9	42.4	4.24	0.04
DC75	D75	8	41	9	9	6	24	8	15	46	1	25795	213.6	53.5	5.35	0.04
DC76	D76	8	43	9	10	6	24	8	15	47	2	1774	214.8	1.5	0.15	0.04

CLIENT: COTTER CORP. PROJECT: RADON FLUX MEASUREMENTS, CANON CITY, CO PROJECT NO.: 08005.00

PILE: PRIMARY BATCH: D SURFACE: SOIL AIR TEMP MIN: 59°F WEATHER: NO RAIN Wt. Out: 180.0 g.
AREA: COVER DEPLOYED: 6 21 8 RETRIEVED: 6 22 8 CHARCOAL BKG: 147 cpm TARE WEIGHT: 29.2 g.
FIELD TECHNICIANS: P. Usnick, M. Currey, M. Villagrana COUNTED BY: DLC DATA ENTRY BY: DLC
COUNTING SYSTEM I.D.: M01/D21, M02/D20 CAL. DUE: 6/05/09

GRID LOCATION	SAMPLE I. D.	DEPLOY HR	RETRV MIN	ANALYSIS MO	DA	YR	MID-TIME HR	CNT (MIN)	GROSS COUNTS	GROSS WT IN	RADON pCi/m ² s	± pCi/m ² s	LLD pCi/m ² s	COMMENTS:		
DC77	D77	8	45	9	11	6	24	8	15	49	1	4635	218.8	9.4	0.94	0.04
DC78	D78	8	46	9	12	6	24	8	15	50	1	7094	216.9	14.5	1.45	0.04
DC79	D79	8	48	9	12	6	24	8	15	51	1	12309	215.3	25.4	2.54	0.04
DC80	D80	8	49	9	13	6	24	8	15	51	1	3079	220.7	6.1	0.61	0.04
DC81	D81	8	51	9	14	6	24	8	15	52	1	3490	217.1	7.0	0.70	0.04
DC82	D82	8	52	9	14	6	24	8	15	52	1	2563	212.9	5.0	0.50	0.04
DC83	D83	8	53	9	14	6	24	8	15	54	2	1738	214.3	1.5	0.15	0.04
DC84	D84	8	54	9	15	6	24	8	15	53	1	16802	214.9	34.8	3.48	0.04
DC85	D85	8	56	9	16	6	24	8	15	56	1	7388	221.8	15.2	1.52	0.04
DC86	D86	8	57	9	17	6	24	8	15	56	1	2492	216.8	4.9	0.49	0.04
DC87	D87	8	58	9	17	6	24	8	15	57	1	1616	212.3	3.1	0.31	0.04
DC88	D88	8	58	9	17	6	24	8	15	57	1	14921	215.2	30.9	3.09	0.04
DC89	D89	8	59	9	18	6	24	8	15	58	1	3015	213.2	6.0	0.60	0.04
DC90	D90	9	0	9	18	6	24	8	15	58	1	9804	219.6	20.2	2.02	0.04
DC91	D91	9	1	9	18	6	24	8	15	59	1	7575	217.9	15.6	1.56	0.04
DC92	D92	9	2	9	19	6	24	8	15	59	1	7692	225.6	15.8	1.58	0.04
DC93	D93	9	3	9	20	6	24	8	16	3	3	1089	216.8	0.5	0.05	0.04
DC94	D94	9	5	9	22	6	24	8	16	2	1	2488	215.3	4.9	0.49	0.04
DC95	D95	9	5	9	23	6	24	8	16	5	1	16036	216.2	33.4	3.34	0.04
DC96	D96	9	6	9	23	6	24	8	16	6	4	1121	222.0	0.3	0.04	0.04
DC97	D97	9	7	9	23	6	24	8	16	10	1	1856	232.6	3.6	0.36	0.04
DC98	D98	9	8	9	26	6	24	8	16	10	1	4684	230.7	9.5	0.95	0.04
DC99	D99	9	9	9	25	6	24	8	16	13	3	1216	216.0	0.5	0.05	0.04
DC100	D100	9	10	9	25	6	24	8	16	12	1	1260	213.8	2.3	0.23	0.04
AVERAGE RADON FLUX RATE FOR THE PRIMARY COVERED REGION:												14.2	pCi/m ² s			
												0.2	pCi/m ² s	MIN		
												110.6	pCi/m ² s	MAX		

BLANK CANISTER ANALYSIS:

GRID LOCATION	SAMPLE I. D.	DEPLOY HR	RETRIV HR	ANALYSIS MIN	MO	DA	YR	MID-TIME HR	CNT (MIN)	GROSS COUNTS	GROSS WT IN	RADON pCi/m ² s	± pCi/m ² s	LLD pCi/m ² s	COMMENTS:	
D BLANK 1	D101	6	22	9	25	6	24	8	16	22	10	1614	209.4	0.03	0.03	CONTROL
D BLANK 2	D102	6	22	9	25	6	24	8	16	22	10	1550	209.8	0.02	0.03	CONTROL
D BLANK 3	D103	6	22	9	25	6	24	8	16	33	10	1669	209.4	0.04	0.03	CONTROL
D BLANK 4	D104	6	22	9	25	6	24	8	16	33	10	1510	212.4	0.01	0.03	CONTROL
D BLANK 5	D105	6	22	9	25	6	24	8	16	43	10	1641	212.7	0.03	0.03	CONTROL
AVERAGE BLANK CANISTER ANALYSIS FOR THE PRIMARY COVERED REGION:														0.02	pCi/m ² s	

CLIENT: COTTER CORP. PROJECT: RADON FLUX MEASUREMENTS, CANON CITY, CO PROJECT NO.: 08005.00

PILE: PRIMARY BATCH: F SURFACE: TAILINGS AIR TEMP MIN: 58°F WEATHER: 0.02 INCHES AFTER PLACEMENT
AREA: BEACH DEPLOYED: 6 28 8 RETRIEVED: 6 29 8 CHARCOAL BKG: 145 cpm Wt. Out: 180.0 g.
FIELD TECHNICIANS: P. Usnick, M. Currey, M. Villagrana COUNTED BY: DLC DATA ENTRY BY: DLC TARE WEIGHT: 29.2 g.
COUNTING SYSTEM I.D.: M01/D21, M02/D20 CAL. DUE: 6/05/09

LOCATION	SAMPLE I. D.	DEPLOY HR	RETRV MIN	ANALYSIS MO	MID-TIME DA	CNT MIN	GROSS COUNTS	GROSS WT IN	RADON pCi/m ² s	± pCi/m ² s	LLD pCi/m ² s	COMMENTS
TB01	F01	6 49	7 53	7 2	8 20	45 3	1204	225.5	0.7	0.07	0.05	
TB02	F02	6 50	7 54	7 2	8 20	47 5	1065	225.3	0.2	0.04	0.05	
TB03	F03	6 52	7 55	7 2	8 20	50 1	7163	223.2	18.0	1.80	0.05	
TB04	F04	6 54	7 55	7 2	8 20	50 1	4762	226.5	11.8	1.18	0.05	
TB05	F05	6 56	7 55	7 2	8 20	52 1	2017	231.5	4.8	0.48	0.05	
TB06	F06	6 57	7 57	7 2	8 20	53 3	1111	232.8	0.6	0.06	0.05	
TB07	F07	6 58	7 57	7 2	8 20	56 3	1286	232.9	0.7	0.07	0.05	
TB08	F08	7 0	7 57	7 2	8 20	55 1	18385	234.9	46.9	4.69	0.05	
TB09	F09	7 1	7 57	7 2	8 20	59 2	1175	230.0	1.1	0.11	0.05	
TB10	F10	7 2	7 58	7 2	8 21	1 4	1001	225.5	0.3	0.05	0.05	
TB11	F11	7 4	8 1	7 2	8 21	4 1	5218	226.7	13.1	1.31	0.05	
TB12	F12	7 7	8 0	7 2	8 21	4 1	1121	222.2	2.5	0.25	0.05	
TB13	F13	7 8	8 0	7 2	8 21	5 1	9974	222.1	25.4	2.54	0.05	
TB14	F14	7 9	8 0	7 2	8 21	6 2	1742	224.0	1.9	0.19	0.05	
TB15	F15	7 10	8 1	7 2	8 21	8 2	1286	219.3	1.3	0.13	0.05	
TB16	F16	7 11	8 1	7 2	8 21	8 1	7960	221.5	20.2	2.02	0.05	
TB17	F17	7 12	8 1	7 2	8 21	11 2	1453	221.3	1.5	0.15	0.05	
TB18	F18	7 13	8 5	7 2	8 21	10 1	2259	221.7	5.5	0.55	0.05	
TB19	F19	7 15	8 5	7 2	8 21	14 3	1100	224.8	0.6	0.06	0.05	
TB20	F20	7 17	8 4	7 2	8 21	13 1	4973	224.8	12.5	1.25	0.05	
TB21	F21	7 18	8 3	7 2	8 21	18 5	1206	223.8	0.3	0.05	0.05	
TB22	F22	7 23	8 5	7 2	8 21	16 1	5270	226.0	13.3	1.33	0.05	
TB23	F23	7 24	8 5	7 2	8 21	21 1	7805	217.6	20.0	2.00	0.05	
TB24	F24	7 27	8 4	7 2	8 21	21 1	1972	226.2	4.8	0.48	0.05	
TB25	F25	7 28	8 7	7 2	8 21	23 1	5194	226.5	13.2	1.32	0.05	
TB26	F26	7 30	8 7	7 2	8 21	23 1	5448	217.0	13.8	1.38	0.05	
TB27	F27	7 31	8 8	7 2	8 21	24 1	17361	220.6	45.0	4.50	0.05	
TB28	F28	7 32	8 8	7 2	8 21	24 1	2206	222.6	5.4	0.54	0.05	
TB29	F29	7 34	8 8	7 2	8 21	26 3	1396	221.4	0.8	0.08	0.05	
TB30	F30	7 34	8 9	7 2	8 21	27 4	1015	227.4	0.3	0.05	0.05	
TB31	F31	7 35	8 9	7 2	8 21	30 1	8354	221.2	21.5	2.15	0.05	
TB32	F32	7 36	8 9	7 2	8 21	30 1	1362	225.5	3.2	0.32	0.05	
TB33	F33	7 40	8 10	7 2	8 21	31 1	36570	224.3	95.8	9.58	0.05	
TB34	F34	7 41	8 10	7 2	8 21	31 1	1002	224.1	2.2	0.22	0.05	
TB35	F35	8 2	8 10	7 2	8 21	32 1	40873	223.1	108.6	10.86	0.05	
TB36	F36	8 3	8 10	7 2	8 21	33 2	1402	225.9	1.5	0.15	0.05	
TB37	F37	8 5	8 11	7 2	8 21	35 1	43780	218.7	116.5	11.65	0.05	
TB38	F38	8 6	8 11	7 2	8 21	35 1	1148	225.9	2.7	0.27	0.05	

CLIENT: COTTER CORP.

PROJECT:

RADON FLUX MEASUREMENTS, CANON CITY, CO

PROJECT NO.: 08005.00

PILE: PRIMARY BATCH: F SURFACE: TAILINGS

AIR TEMP MIN: 58°F

WEATHER: 0.02 INCHES AFTER PLACEMENT

AREA: BEACH DEPLOYED: 6 28 8 RETRIEVED: 6 29 8 CHARCOAL BKG:

FIELD TECHNICIANS: P Usnick, M.Villagrana

COUNTED BY: DLC DATA ENTRY BY: DLC

WT. Out: 180.0 g.

COUNTING SYSTEM I.D.: M01/D21, M02/D20 CAL. DUE: 6/05/09

TARE WEIGHT: 29.2 g.

LOCATION	SAMPLE I. D.		DEPLOY		RETRIV		ANALYSIS			MID-TIME		CNT (MIN)	GROSS COUNTS	GROSS WT IN	RADON pCi/m ² s	± pCi/m ² s	LLD pCi/m ² s	COMMENTS:
	HR	MIN	HR	MIN	MO	DA	YR	HR	MIN									
TB39	F39	8	7	8	11	7	2	8	21	36	1	21486	224.3	57.0	5.70	0.05		
TB40	F40	8	10	8	12	7	2	8	21	36	1	14980	219.6	39.6	3.96	0.05		
TB41	F41	8	10	8	11	7	2	8	21	37	1	8109	229.6	21.3	2.13	0.05		
TB42	F42	8	11	8	49	7	2	8	21	37	1	14739	222.3	37.9	3.79	0.05		
TB43	F43	8	12	8	50	7	2	8	21	38	1	17376	226.7	44.9	4.49	0.05		
TB44	F44	8	14	8	50	7	2	8	21	38	1	25219	217.9	65.2	6.52	0.05		
TB45	F45	8	15	8	51	7	2	8	21	39	1	7869	227.2	20.1	2.01	0.05		
TB46	F46	8	16	8	51	7	2	8	21	39	1	3521	227.1	8.8	0.88	0.05		
TB47	F47	8	17	8	52	7	2	8	21	41	1	3478	223.1	8.7	0.87	0.05		
TB48	F48	8	18	8	52	7	2	8	21	41	1	7926	228.3	20.3	2.03	0.05		
TB49	F49	8	20	8	52	7	2	8	21	42	1	16362	226.7	42.4	4.24	0.05		
TB50	F50	8	21	8	53	7	2	8	21	42	1	11265	223.2	29.0	2.90	0.05		
TB51	F51	8	21	8	53	7	2	8	21	43	1	11740	226.4	30.3	3.03	0.05		
TB52	F52	8	22	8	53	7	2	8	21	43	1	17672	224.8	45.7	4.57	0.05		
TB53	F53	8	27	8	54	7	2	8	21	44	1	23182	220.3	60.4	6.04	0.05		
TB54	F54	8	28	8	54	7	2	8	21	44	1	3279	221.3	8.2	0.82	0.05		
TB55	F55	8	29	8	54	7	2	8	21	45	1	1942	228.2	4.7	0.47	0.05		
TB56	F56	8	29	8	56	7	2	8	21	45	1	1123	236.8	2.6	0.26	0.05		
TB57	F57	8	32	8	56	7	2	8	21	49	5	1161	229.9	0.2	0.05	0.05		
TB58	F58	8	33	8	56	7	2	8	21	47	1	7048	229.1	18.1	1.81	0.05		
TB59	F59	8	36	8	57	7	2	8	21	52	1	1872	227.3	4.6	0.46	0.05		
TB60	F60	8	37	8	57	7	2	8	21	52	1	9082	226.5	23.5	2.35	0.05		
TB61	F61	8	38	8	57	7	2	8	21	53	1	4116	222.2	10.5	1.05	0.05		
TB62	F62	8	39	8	58	7	2	8	21	53	1	2780	232.9	6.9	0.69	0.05		
TB63	F63	8	41	8	58	7	2	8	21	54	1	4353	226.4	11.1	1.11	0.05		
TB64	F64	8	43	9	20	7	2	8	21	54	1	1703	227.7	4.0	0.40	0.05		
TB65	F65	8	45	9	20	7	2	8	21	55	1	3310	233.7	8.2	0.82	0.05		
TB66	F66	8	46	9	20	7	2	8	21	55	1	3021	224.6	7.5	0.75	0.05		
TB67	F67	8	47	9	23	7	2	8	21	57	1	29913	224.0	77.5	7.75	0.05		
TB68	F68	8	48	9	23	7	2	8	21	57	1	2524	234.9	6.2	0.62	0.05		
TB69	F69	8	50	9	23	7	2	8	21	58	1	79888	235.8	208.0	20.80	0.05		
TB70	F70	8	51	9	25	7	2	8	21	58	1	350329	233.1	909.6	90.96	0.05		
TB71	F71	8	53	9	25	7	2	8	21	59	1	65700	232.3	171.1	17.11	0.05		
TB72	F72	8	54	9	25	7	2	8	21	59	1	204929	223.9	533.0	53.30	0.05		
TB73	F73	8	58	9	26	7	2	8	22	0	1	2048	234.8	5.0	0.50	0.05		
TB74	F74	8	59	9	23	7	2	8	22	0	1	2267	224.2	5.5	0.55	0.05		
TB75	F75	9	0	9	23	7	2	8	22	2	1	4091	223.7	10.4	1.04	0.05		
TB76	F76	9	5	9	28	7	2	8	22	2	1	84053	219.6	219.5	21.95	0.05		

CLIENT: COTTER CORP. PROJECT: RADON FLUX MEASUREMENTS, CANON CITY, CO PROJECT NO.: 080005.00

PILE: PRIMARY BATCH: F SURFACE: TAILINGS AIR TEMP MIN: 58°F WEATHER: 0.02 INCHES AFTER PLACEMENT
AREA: BEACH DEPLOYED: 6 28 8 RETRIEVED: 6 29 8 CHARCOAL BKG: 145 cpm Wt. Out: 180.0 g.
FIELD TECHNICIANS: P. Usnick, M. Currey, M. Villagrana COUNTED BY: DLC DATA ENTRY BY: DLC TARE WEIGHT: 29.2 g.
COUNTING SYSTEM I.D.: M01/D21, M02/D20 CAL. DUE: 6/05/09

LOCATION	SAMPLE I. D.		DEPLOY		RETRIV		ANALYSIS		MID-TIME		CNT	GROSS	GROSS	RADON	±	LLD	COMMENTS:
			HR	MIN	HR	MIN	MO	DA	YR	HR	MIN	COUNT/S	WT	IN	pCi/m² s	pCi/m² s	
TB77	F77	9	9	28	7	2	8	22	3	1	1170	230.5	2.7	0.27	0.05		
TB78	F78	9	11	9	32	7	2	8	22	3	1	5259	234.5	13.4	1.34	0.05	
TB79	F79	9	12	9	35	7	2	8	22	4	1	13688	233.0	35.5	3.55	0.05	
TB80	F80	9	15	9	35	7	2	8	22	4	1	30868	228.7	80.5	8.05	0.05	
TB81	F81	9	17	9	37	7	2	8	22	6	1	41272	219.2	108.1	10.81	0.05	
TB82	F82	9	20	9	37	7	2	8	22	6	1	4555	227.6	11.6	1.16	0.05	
TB83	F83	9	21	9	38	7	2	8	22	7	1	5422	230.7	13.9	1.39	0.05	
TB84	F84	9	28	10	4	7	2	8	22	7	1	2712	225.1	6.6	0.66	0.05	
TB85	F85	9	29	10	4	7	2	8	22	9	2	1228	233.7	1.2	0.12	0.05	
TB86	F86	9	30	9	59	7	2	8	22	9	1	1301	220.7	3.0	0.30	0.05	
TB87	F87	9	32	10	3	7	2	8	22	11	1	5353	220.2	13.6	1.36	0.05	
TB88	F88	9	33	10	6	7	2	8	22	11	1	1692	232.8	4.0	0.40	0.05	
TB89	F89	9	34	10	2	7	2	8	22	15	5	1204	229.5	0.3	0.05	0.05	
TB90	F90	9	35	9	59	7	2	8	22	13	1	4942	223.3	12.5	1.25	0.05	
TB91	F91	9	40	9	57	7	2	8	22	18	1	6486	219.1	16.7	1.67	0.05	
TB92	F92	9	42	9	59	7	2	8	22	18	1	1727	231.7	4.1	0.41	0.05	
TB93	F93	9	42	9	59	7	2	8	22	20	2	1346	222.6	1.4	0.14	0.05	
TB94	F94	9	43	10	8	7	2	8	22	22	4	1073	223.6	0.3	0.05	0.05	
TB95	F95	9	44	10	8	7	2	8	22	28	2	1336	223.4	1.4	0.14	0.05	
TB96	F96	9	46	9	57	7	2	8	22	27	1	6355	227.0	16.4	1.64	0.05	
TB97	F97	9	47	9	57	7	2	8	22	31	3	1133	225.1	0.6	0.07	0.05	
TB98	F98	9	48	9	56	7	2	8	22	31	3	1400	228.7	0.8	0.08	0.05	
TB99	F99	9	49	9	56	7	2	8	22	34	1	2416	228.4	6.0	0.60	0.05	
TB100	F100																VOID

AVERAGE RADON FLUX RATE FOR THE PRIMARY BEACHES REGION:													
										38.2	pCi/m ² s	MIN	MAX
										0.2	pCi/m ² s		
										909.6	pCi/m ² s		

BLANK CANISTER ANALYSIS:

GRID LOCATION	SAMPLE I. D.	DEPLOY HR	RETRIV HR	ANALYSIS MIN	MO	DA	YR	MID-TIME HR	CNT (MIN)	GROSS COUNTS	GROSS WT	RADON IN pCi/m ² s	± pCi/m ² s	LLD pCi/m ² s	COMMENTS :		
F BLANK 1	F101	6	49	9	56	7	2	8	22	46	10	1758	208.6	0.07	0.03	0.04	CONTROL
F BLANK 2	F102	6	49	9	56	7	2	8	22	46	10	1813	211.7	0.09	0.03	0.04	CONTROL
F BLANK 3	F103	6	49	9	56	7	2	8	22	57	10	1805	211.8	0.08	0.03	0.04	CONTROL
F BLANK 4	F104	6	49	9	56	7	2	8	22	57	10	1711	212.4	0.06	0.03	0.04	CONTROL
F BLANK 5	F105	6	49	9	56	7	2	8	23	8	10	1716	209.4	0.06	0.03	0.04	CONTROL
AVERAGE BLANK CANISTER ANALYSIS FOR THE PRIMARY BEACHES REGION:													0.07	pCi/m ² s			

Appendix D

Map (Figure 2)

Figure 1
Large Area Activated Charcoal Canisters Diagram

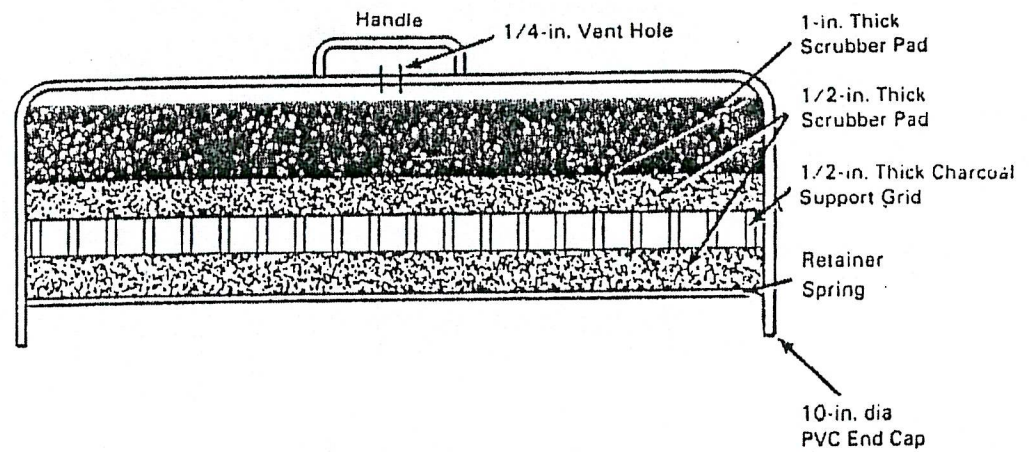


FIGURE 1 Large-Area Radon Collector

